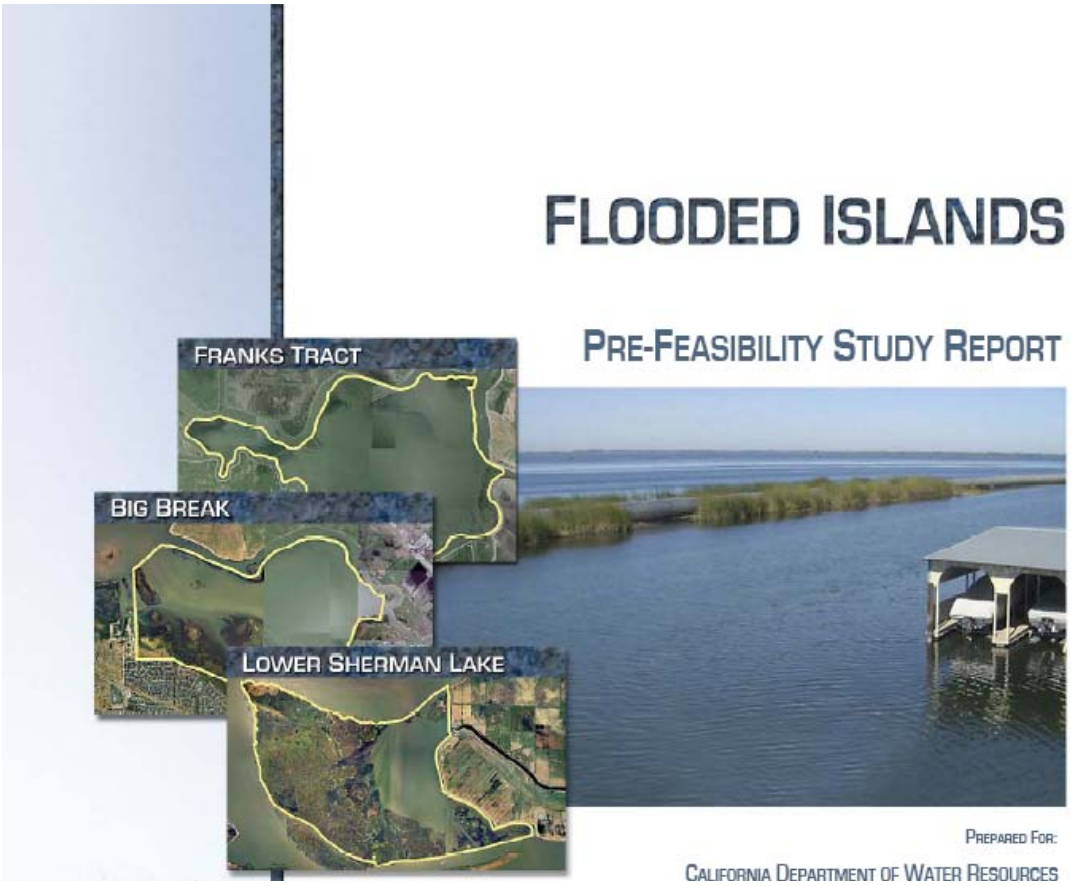
Addendum
to the
Flooded Island Pre-feasibility Study Report



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Addendum to the
Flooded Islands Pre-Feasibility Study

This is an Addendum to the Flooded Islands Pre-Feasibility Study Report which was initiated by the California Department of Water Resources (DWR) to develop and evaluate water quality, ecosystem and recreational improvements on the flooded islands of Franks Tract, Lower Sherman Lake and Big Break. The pre-Feasibility Study Report is available on DWR's Bay-Delta Office website, http://baydeltaoffice.water.ca.gov/ndelta/floodedislands/FloodedIslandsPre-FeasibilityReport6-05.pdf. This study found that modifications to flooded islands could significantly improve water quality during drier times of the year while enhancing Delta ecosystem values and recreation opportunities. This Pre-feasibility study was conducted from a grant from the California Bay-Delta Authority (formerly CALFED). The work performed under this Addendum was funded by urban State Water Project water contractors.

Purpose

This Addendum to the Flooded Islands Pre-Feasibility Study Report was initiated to address some of the major comments on the study. The initial plan was to address refinements and optimization of the project alternatives and evaluating the long-term analysis of the water quality benefits of the preferred project alternatives. However, due to the limited time and funding, the scope of this effort was reduced to evaluating the water quality benefits of one potential pilot project alternative on Franks Tract and developing cost estimates of a few Franks Tract pilot project alternatives.

Multiple-year Water Quality Modeling

In the Flooded Islands Pre-Feasibility Study, the water quality modeling was limited to evaluation of potential project affect in 2002, which was a dry water–year. However, in order to determine the feasibility of implementing a project, a long-term period of analysis should be evaluated to determine the stream of potential water quality benefits that might be obtained as well as the initial costs of constructing and annual cost of operating the project. In the modeling a proposed project which would operate into the future, planning simulations would be done into the future at a given level of water use and hydrology. However, for these studies it was decided to use historical-based simulations, with observed boundary flows and historical Delta features. The historical base runs would serve as a rough verification of the model calibration and a check to see how its results compare to observed data which would not possible with a planning simulation.

The water years 1991 through 2003 were selected for the simulations because they provide a variety of year classifications and noticeable changes between wet and dry periods.

	Sacramento Valley					San Joaquin Valley				
	Runoff (maf)			WY Index		Runoff (maf)			WY Index	
WY	Oct-Mar	Apr-Jul	WYsum	Index	Yr-type	Oct-Mar	Apr-Jul	WYsum	Index	Yr-type
1991	**3.90**	**4.01**	**8.44**	**4.21**	**C**	**0.56**	**2.57**	**3.20**	**1.96**	**C**
1992	**5.41**	**2.93**	**8.87**	**4.06**	**C**	**0.86**	**1.66**	**2.58**	**1.56**	**C**
1993	12.44	8.98	22.21	8.54	AN	2.49	5.65	8.38	4.20	W
1994	4.55	2.73	7.81	5.02	C	0.66	1.80	2.54	2.05	C
1995	**19.83**	**13.60**	**34.55**	**12.89**	**W**	**3.67**	**8.01**	**12.32**	**5.95**	**W**
1996	13.05	8.37	22.29	10.26	W	2.57	4.51	7.22	4.12	W
1997	20.22	4.39	25.42	10.82	W	5.75	3.59	9.51	4.13	W
1998	17.65	12.54	31.40	13.31	W	2.82	7.11	10.43	5.65	W
1999	12.97	7.26	21.19	9.80	W	1.90	3.85	5.91	3.59	AN
2000	**12.06**	**5.96**	**18.90**	**8.94**	**AN**	**1.98**	**3.78**	**5.90**	**3.38**	**AN**
2001	5.64	3.46	9.81	5.76	D	0.92	2.23	3.18	2.20	D
2002	**9.32**	**4.57**	**14.60**	**6.35**	**D**	**1.27**	**2.75**	**4.06**	**2.34**	**D**
2003	**10.71**	**7.74**	**19.31**	**8.21**	**AN**	**1.25**	**3.49**	**4.87**	**2.81**	**BN**

The calibrated RMA two-dimensional finite-element Delta model was used to evaluate years 1991 (critical), 1992 (critical), 1995 (wet), 2000 (above normal), 2002 (dry), and 2003(above normal). The purpose of the Flooded Islands Study is to evaluate potential to create water quality, ecosystem, recreation and other benefits at Franks Tract, Lower Sherman Lake and Big Break. Of these three study areas, the most intensively investigated has been Franks Tract because preliminary field and model data indicate that hydrodynamic conditions of the island may result in dramatic effects in overall salinity conditions in the Delta.

A variety of Franks Tract management alternatives was undertaken to develop a better understanding of the complex physical phenomena involved with the salinity intrusion and mixing occurring within Franks Tract. These efforts are described in *Flooded Islands Pre-Feasibility Study, Alternatives Modeling Report* (June 2005). With this knowledge, preferred alternatives for Delta water quality improvement were selected for further analysis in the current Pilot Project study, including optimization of previously studied alternatives, and multiple-year simulations. The results are shown in the Flooded Islands Pilot Project Modeling Report prepared by Resource Management Associates, dated January 31, 2006, provided as Exhibit A.

Pilot Project Design Criteria and Construction Estimates

Moffat and Nichols who has significant experience in marine structures and foundations were asked to develop alternative design and construction concepts for a Franks Tract Pilot Project. The primary design criteria used was minimizing cost, easy deployment and functionality, aesthetics, environmentally sensitive, speed of construction, high reliability, and relocatability. Several concepts were developed. They included a prefabricated barrier on a pile foundation with a sliding gate, a horizontally rotating radial gate on a pile foundation, a pivot

(turnstile) gate on a pile foundation, a buoyancy gate on a pile foundation, a louvered-gate structure on a pile foundation, and a pendant-mounted gate on a pile foundation. A presentation of these conceptual alternatives is provided in Exhibit B.

Cost estimates were developed for three operable alternatives. They include a gated structure on West False River on the west end of Franks Tract, gated structure on the east levee of Franks Tract along Old River and two gated structures near the south-east corner of Franks Tract. The construction for these structures required site preparation work including dredging and foundation preparation. The construction materials included sheet piling and prefabricated pivot gates installed with a pile foundation, and prefabricated pendant structures on a pile foundation. Information on these cost estimates is provided in Exhibit C.

Franks Tract Pilot Project Alternatives
Construction Cost Estimates

	Without Operable Gates	With Operable Gates
West False River Structure	$17,500,000	$20,975,000
East Levee Structure	$43,892,000	$50,983,000
Old River/Holland Structure	$23,648,000	$27,446,000

Long-Term EC Reduction Analysis

The average monthly and peak monthly EC reductions for the West False River Pilot Project Structure for the May through December period and the January through December period are shown in the following tables. During the critical years of 1991 and 1992, the annual average EC reductions at the SWP export facility were 6.52 and 5.46 percent, respectively. During the dry year of 2002, the annual average EC reduction at the SWP export facility was 3.95 percent. During above normal years of 2000 ands 2003, the annual average EC reductions at the SWP export facility were 2.56 and 3.05 percent, respectively. During the wet year of 1995, the annual average EC reductions at the SWP export facility was 0.13 percent.

Correlations were made between the EC reductions at the SWP export facility and the Water Year Indexes for both the Sacramento Valley and San Joaquin Valley. The coefficient of determination (R^2) of a straight line relationship between the annual average EC reduction and the water year index was found to be 0.9643 for the Sacramento Valley water year index and 0.8521 for the San Joaquin Valley water year index. These results reflect a good correlation

between the two variables as one might expect. Using the best-fit straight line of the six years, the EC reductions were estimated for all the other water years 1906-2005 for the Sacramento Valley and the San Joaquin Valley for the water years 1901 - 2005. The minimum, maximum and average annual EC reductions of a non-gated salinity control pilot project are shown in the following table.

Annual EC Reduction Summary	**Estimated Sacramento Valley Water Years 1906-2005**
Minimum	-1.6 %
Average	3.1 %
Maximum	6.5 %

In summary, these results indicate that over the 100 year period of 1906 to 2005, the average EC reduction of a pilot project would be about 3.1%. The maximum EC reduction of 6.5% occurred in 1977 which was a “critically” dry year and the minimum EC reduction of -1.6% occurred in 1983 which was a “wet” year. The data and results for this analysis are provided in Exhibit D.

Potential for Increased EC Reductions

Due to the limited time and funding that was available this fiscal year, further evaluations of other pilot projects alternatives could not be investigated. However, technical experts were confident that further EC reductions could be developed through the operation of the gated structure which would improve the control of salinity on the tidal cycles. Upon acquiring further funding for the project, evaluating the water quality benefits of a gated salinity control structure would be one of the first tasks which would be performed.